SS 11 NR-01 16:00 English

Histogram analysis of the T1 hyperintensity in the substantia nigra in patients with parkinson disease dementia (PDD), alzheimer disease (AD) and age-matched controls

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PURPOSE: Neuromelanin loss of substantia nigra (SN) can be visualized by T1 signal reduction by using heavily T1-weighted high-resolution imaging. We investigated whether histogram analysis of T1 hyperintensity for SN can be used for differentiating between PDD, AD and age-matched controls.

MATERIALS AND METHODS: This retrospective study enrolled 10 patients with PDD, 18 patients with AD and 13 age-matched healthy elderly controls. MR imaging was performed at 3T (GE Signal HDx). ROIs for SN were drawn onto heavily T1-weighted FSE sequence through mibrain level, using the MIPAV software. The measurement difference was tested by using analysis of variance (ANOVA) after testing for normality of the data set. For histogram analysis, signal intensities of ROIs were normalized among the subjects.

RESULTS: Mean SI of the SN ROI tended to be lower in PDD than in AD and normal controls but without statistical significance (998.50 $\pm$ 76.74 versus 1036.46 $\pm$ 117.23 versus 1067.13 $\pm$ 73.26, $p = 0.249$). While maximum, mode, skewness, 75th percentile and 90the percentile of SN ROI did not show significant difference among three groups, kurtosis significantly differed among PDD, AD and normal subjects (9.10 $\pm$ 5.19, 6.04 $\pm$ 1.79, and 7.91$\pm$2.61, $p = 0.049$), in particular between PDD and AD ($p = 0.019$).

CONCLUSION: Although T1 signal intensity itself did not help differentiating between PDD, AD and controls, histogram analysis of T1 signal intensity for SN might provide additional diagnostic clues for differential diagnosis between PDD and AD.